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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,853	02/08/2002	Setsunobu Wakamoto	70840/56,965	1398

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EXAMINER
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SETH, MANAV

ART UNIT	PAPER NUMBER
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2625

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/071,853	WAKAMOTO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Manav Seth	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on 28 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13 and 15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 and 14 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 8, 10, 11 and 15 is/are rejected.
- 7) ☐ Claim(s) 5, 7, 9, 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>04/01/2002</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment filed 28 March 2005 has been entered in full.
2. Based on Applicant's amendments, the objection to the specification has been withdrawn.
3. Based on Applicant's amendments, the 35 USC 112 2<sup>nd</sup> paragraph rejection on claims 13 and 14 has been withdrawn.
4. Based on Applicant's amendments, the 35 USC 101 rejection on claims 15 and 16 has been withdrawn.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 4, 6, 8, 10, 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, U.S. Patent No. 6,118,474 and further in view of

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Zimmermann, U.S. Patent No. 5,185,667 and further in view of Ejiri et al., U.S. Patent No. 6,366,360.

Nayar discloses an imaging system, which comprises of a reflecting mirror having a geometrical shape of a paraboloid (figure 1A; column 12, lines 35-36) which satisfies the limitation using a reflecting mirror in **claim 1**.

Nayar discloses an imaging system, which includes an **imaging section** comprising of a camera connected to the computer and computer further provides image processing functions on the obtained image (Figure 1A; column 7, lines 52-65). Nayar further discloses of an image signal processing for performing coordinate transformation on captured image signal to produce a perspective image (column 4, lines 5-13) and **performing coordinate transformation is geometrical transformation and correction**. Nayar does not teach the detailed steps of method with respect to the system components.

However, Zimmermann discloses a omniview imaging system that captures omniview wide angle images and perform image processing (figure 1 and abstract). Zimmermann further discloses the method of transforming the captured images and displaying it on the monitor. Zimmermann discloses of first step of capturing an image and storing it in the input image buffer (element 4) (column 3, lines 28-32). **Zimmermann discloses the next (second) step of performing the coordinate**

**transformation on the image stored in input image buffer according to an instruction from user to produce an corrected perspective transformed image** (abstract; column 3, lines 32-43; column 2, lines). Zimmermann further discloses the next (third) step of the method of storing the perspective transformed image in output image buffer and then displaying on the monitor or display device and these steps can be repeated for acquiring the next image.

Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to use the detail method steps of Zimmermann in the invention of Nayar. One would have been motivated to use the method of the detail method steps of Zimmermann in the invention of Nayar because both Nayar and Zimmermann are directed to obtain images of wide angle view and Zimmermann like Nayar comprises of an imaging section of which Zimmerman further provides the detailed steps of processing the image with respect to the components which provides the user a greater detail of image processing.

Both Nayar and Zimmermann do not teach the details of correcting distortion in the captured image based on a value regarding a distance between a lens position and a light-receiving surface of the imaging device. However, **Ejiri discloses of an imaging systems comprising of a CCD camera and an image correction unit (figure 3; col. 4, lines 5-40)**. Ejiri discloses of positioning the center of the lens of the camera in several positions (figure 8; column 4, lines 15-17) and further **discloses the distance**

**(R) between the center of the lens (element 1) and the light-receiving surface (3) is variable (figure 6; column 7, lines 52-58; col. 10, lines 1-7 and lines 48-50).** Ejiri further discloses of correcting the captured distorted image by calculating distortion aberration coefficients **based on a value regarding a distance (R) between a lens position and a light-receiving surface of the imaging device** (column 7, lines 5-25 and lines 50-58). Ejiri further discloses an onboard keyboard (operation panel) or an input unit (108), used to input or select a set of parameter data which is later used in correcting the distortion aberration in the image data (column 4, lines 37-40). Ejiri further discloses of setting of parameter R (column 8, lines 37-39 and column 10, lines 48-50). Adjusting the parameter R is basically adjusting the zoom level of the camera and varying zoom to further correct the image will result in change in position of image coordinates according to perspective transformation.

Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to use the method of Ejiri in the combined invention of Nayar and Zimmermann. One would have been motivated to use the method of correcting the captured image by Ejiri in the invention of Nayar and Zimmeremann because (a) the combined invention of Nayar and Zimmermann and (b) **Ejiri are directed to capture images at wide angles and performing image processing on the images captured from a curved surface (see Ejiri, column 11, lines 26-30)** and Ejiri further provides the details of correcting distorted images captured at various incident angles in order to compensate the lens aberration effects (geometrical

distortions). **Adjusting the distance (R) (col. 10, lines 48-50)** between the center of the lens and the light-receiving surface will help in aligning the images to proper expected image without distortion. Correcting geometrical distortions in an image is adjusting and aligning the coordinates of the distorted image back to the proper alignment which is considered as coordinate transformation and this is well known in the art of image processing.

**Claim 4 and 6** has been analyzed and rejected as per claim 1.

**Claim 8** recites the components of the image processing section. Nayar does provide a computer connected to the camera and the monitor for image processing but does not teach the inner component details of the computer. Zimmermann does talk about the processing unit that controls the functions of the systems through system buses (figure 1) and also performs parameter (arithmetic) calculations (column 3, lines 37-38), input and output buffers. Both Nayar and Zimmermann don't talk about the look-up table.

However, Ejiri discloses an onboard CPU (110) connected to other part or components through buses (figure 3; column 4, lines 25-26), memory (102) (input buffer) for storing the input image data (column 4, lines 28-29), a ROM memory (look-up table) (107) which stores a predetermined parameter values of the lens and camera (column 4, lines 32-36). Ejiri further includes a subsection (figure 5, lines 5-22)

which comprise of a calculation control unit (54) which works on ROM memory (look-up table) to work with the parameters (column 5, lines 19-22).

Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to add the ROM memory by Ejiri in the combined invention of Nayar and Zimmermann. One would have been motivated to use ROM memory by Ejiri in the invention of Nayar and Zimmeremann as a look-up table to store the predetermined parameters of the camera and lens, which would be handy while correcting the image distortion.

**Claim 10** additionally recites the use of software or program to control image data in an imaging system. Nayar discloses of programming the computer using software to perform the image processing (column 10, lines 57-60).

**Claim 11** has been analyzed and rejected as per claim 1.

**Claim 15** has been similarly analyzed and rejected as per claim 1 and 10.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, U.S. Patent No. 6,118,474 and further in view of Zimmermann, U.S. Patent No. 5,185,667 and further in view of Ejiri et al., U.S. Patent No. 6,366,360 and further in view of Florent et al., U.S. Patent No. 5,675,380.



**Claim 3** recites "An imaging system according to claim 1, wherein a squared inspection drawing is used as the inspection drawing". Nayar, Zimmerman and Ejiri does not teach of using a squared inspection drawing as the inspection drawing.

However, Florent discloses the design of a grating on a plane where the meshes of this grating are square-shaped or rectangular (figure 1A; column 6, lines 33-35). Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to use the grating by Florent in the combined invention of Nayar, Zimmermann and Ejiri. One would have been motivated to use the grating of Florent in the combined invention of Nayar, Zimmermann and Ejiri because Florent and all other combined references are directed towards removing or compensating the geometrical distortion in the captured image and Florent further uses the grating pattern to identify the geometrical distortion as such the deformed (radial shaped) meshes of the grating pattern will represent the geometrical distortion and this will help in finding the parameter adjusting direction of the optical parameters to remove the distortion and will further help in repositioning the distorted coordinates to the correct position.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, U.S. Patent No. 6,118,474 and further in view of Zimmermann, U.S. Patent No. 5,185,667 and further in view of Ejiri et al., U.S. Patent No. 6,366,360 and further in view of applicant's admitted prior art in application 10/071,853.

**Claim 2** recites the expressions that are used to perform coordinate transformation on captured image data to produce the perspective transformed image data. Applicant is claiming these expressions as is his own invention and also applicant has admitted these expressions to be the part of the related art in the specification on page 1 of the published application 10/071853, therefore claim 2 is rejected as being the part of the related prior art.

### ***Response to Arguments***

9. Applicant's arguments regarding the prior art rejections under Nayar, Zimmerman, Ejiri and Florent on page 14 and 15 of the Amendment filed on 28 March 2005 have been fully considered but are not persuasive.

10. In the 2<sup>nd</sup> paragraph on page 14 of the Amendment, Applicant argues in substance:

**a. Zimmermann does not teach a reflecting mirror or an imaging section that receives an image from a lens opposite the reflecting mirror.**

Examiner respectfully disagrees. As explained in the rejection of claim 1, Nayar clearly shows a imaging apparatus where an imaging section which includes an imaging device (111) for receiving light concentrated by lens (112) where lens is opposed to the reflecting mirror (135), further connected to the computer and computer further provides image processing functions on the obtained image (Figure 1A; column 7, lines 52-65).

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Nayar discloses an image signal processing for performing coordinate transformation on captured image signal to produce a perspective image (column 4, lines 5-13) and **performing coordinate transformation is geometrical transformation and correction** and Nayar further teaches of **performing interpolation (image correction)** (col. 4, line 13) but Nayar does not teach the detailed steps of method with respect to the system components. Similarly, Zimmermann discloses a omniview imaging system (section) that captures omniview wide angle images and perform image processing (figure 1 and abstract) and **provides the detailed steps of image processing (same as Nayar) with respect to system components** of which Nayar is silent. Examiner asserts that it is a matter of replacing imaging system (section) of Nayar by Zimmermann, which would work the same way upon receiving light concentrated by a lens opposing the reflecting mirror, therefore making Nayar and Zimmermann a proper combination. Examiner does not rely on Zimmermann to provide the teachings of using a reflecting mirror as reflecting mirror is provided by Nayar.

11. In the last paragraph on page 14 of the Amendment, Applicant argues in substance:

**b. Ejiri deals with optical units having lenses and does not address hyperboloidal mirrors.**

Examiner respectfully submits that Examiner does not rely on Ejiri to provide the teachings of using a reflecting mirror such as hyperboloidal mirror as reflecting mirror is provided by Nayar. However, Ejiri clearly teaches an imaging system comprising of a

CCD camera and an image correction unit which further includes a computer to perform image correction (figure 3; col. 4, lines 5-40). Further, Ejiri clearly teaches that the invention is applicable to images formed on a curved surface as well as spherical surface for correcting distortion aberration in the images (column 11, lines 26-31).

12. In the 2<sup>nd</sup> paragraph on page 15 of the Amendment, Applicant argues in substance:

**c. There is nothing in Ejiri that teaches, mentions or suggests correcting distortion "based on a value regarding a distance between a lens position adapted for the coordinate transformation and a light-receiving surface of imaging device".**

Examiner respectfully disagrees. Both Nayar and Zimmermann do not teach the details of correcting distortion in the captured image based on a value regarding a distance between a lens position and a light-receiving surface of the imaging device and that is why ejiri is brought into consideration. Ejiri like Nayar and Zimmermann discloses an imaging system (section) comprising of a camera with a CCD sensor and an image correction unit (figure 3; col. 4, lines 5-40). Further, Ejiri clearly teaches that the invention is applicable to images formed on a curved surface as well as spherical surface for correcting distortion aberration in the images (column 11, lines 26-31). Ejiri discloses of positioning the center of the lens of the camera in several positions (figure 8; column 4, lines 15-17) and further **discloses the distance (R) between the center of the lens (element 1) and the light-receiving surface (3) is variable** (figure 6;

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column 7, lines 52-58; col. 10, lines 1-7 and lines 48-50). Ejiri further discloses of correcting the captured distorted image by calculating distortion aberration coefficients **based on a value regarding a distance (R) between a lens position and a light-receiving surface of the imaging device** (column 7, lines 5-25 and lines 50-58). For further evidence, Ejiri clearly shows that the value R is adjusted (col. 10, lines 1-5 and lines 48-50). Examiner asserts that it is a matter of using Ejiri's teachings of correcting the captured distorted image by calculating distortion aberration coefficients based on a value regarding a distance (R) between a lens position and a light-receiving surface of the imaging device in the imaging system (section) of Nayar by Zimmermann.

13. In the last paragraph on page 15 of the Amendment, Applicant argues in substance:

**d. The Florent reference does not teach, mention or suggest correcting distortion "based on a value regarding a distance between a lens position adapted for the coordinate transformation and a light-receiving surface of imaging device".**

Examiner respectfully submits that Examiner does not rely on Florent to provide the teachings of correcting distortion "based on a value regarding a distance between a lens position adapted for the coordinate transformation and a light-receiving surface of imaging device" as these teachings are already provided by Ejiri as explained before. Further explanation can be found in rejection of claim 3.

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14. Applicant's arguments regarding the prior art rejections on claim 2 under Nayar, Zimmerman, Ejiri and applicant's admitted prior art on 2<sup>nd</sup> paragraph of page 16 of the Amendment filed on 28 March 2005 have been fully considered but are not persuasive. Claim 2 still stands rejected under 35 USC 103 (a) rejection. Further explanations can be found in rejection of claim 2.

***Allowable Subject Matter***

15. Claims 5, 7 and 9 objected to as being dependent upon a rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons of allowance:

The instant invention is directed to a method of correcting a image captured from the curved surface of the reflecting mirror. The closest prior art (Nayar, U.S. Patent No. 6,118,474) does not teach of an image recognition section where the captured image is compared to the **central projection image**. The limitation "by comparing the produced perspective transformed image to an image expected to be obtained when the captured image is a central projection image" as recited in claim 5 is not disclosed or suggested by the prior art of record. Claims 7 and 9 are dependent on claim 5, therefore they will meet the conditions of allowance as applied to claim 5.

16. Claim 13 is objected to as being dependent upon a rejected base claim 11, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons of allowance:

The instant invention is directed to a method of correcting a image captured from the curved surface of the reflecting mirror. The closest prior art (Nayar, U.S. Patent No. 6,118,474) does not teach of an image correction when a captured image of a prescribed inspection drawing is not determined to be distorted using a method for correcting distortion of a captured image. The limitation "wherein the correction section corrects distortion when a perspective transformed image obtained by capturing an image of a prescribed inspection drawing is not determined to be distorted using a method for correcting distortion of a captured image" as recited in claim 13 is not disclosed or suggested by the prior art of record.

17. Claims 12 and 14 are allowed.

The following is an examiner's statement of reasons of allowance:

The instant invention is directed to a method of correcting a image captured from the curved surface of the reflecting mirror. The closest prior art (Nayar, U.S. Patent No.

6,118,474) does not teach of an image recognition section where the captured image is compared to the **central projection image**. The limitation "a third step for comparing the perspective transformed image data stored in the output buffer memory to expected image data obtained when a captured image is a central projection image by using the image recognition section" as recited in claim 12 is not disclosed or suggested by the prior art of record. Claim 14 is dependent on claim 12, therefore it will meet the conditions of allowance as applied to claim 12.

18. Claim 16 is allowed.

The following is an examiner's statement of reasons of allowance:

The same reasons of allowance applies to claim 16 as applied to claim 12.

### ***Conclusion***

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of




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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (571) 272-7456. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Trainer, Joseph Mancuso, can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Manav Seth  
Art Unit 2625  
April 28, 2005

  
JOSEPH MANCUSO  
PRIMARY EXAMINER